Water Demand for the City of Aberdeen and Proposed Growth Areas

Location	EDU	City[4]		No Planned Service[6]		Total City Demand (City + No Planned Service)		County[5]		Bulk Water[8]		Total	
		Avg. Day (gpd)[1]	Peak Day[2] (gpd)	Avg. Day (gpd)[1]	Peak Day[2] (gpd)	Avg. Day (gpd)[1]	Peak Day[2] (gpd)	Avg. Day (gpd)[1]	Peak Day[2] (gpd)	Avg. Day (gpd)[1]	Peak Day[2] (gpd)	Avg. Day (gpd)[1]	Peak Day[2] (gpd)
Planning Area 16 - Existing[3]	5,940	1,485,000	2,361,150	0	0	1,485,000	2,361,150	0	0	0	0	1,485,000	2,361,150
Planning Area 16 - Infill[4]	5,290	1,322,500	2,102,775	0	0	1,322,500	2,102,775	0	0	0	0	1,322,500	2,102,775
Planning Area 1 - Swan Creek[4]	300	75,000	119,250	0	0	75,000	119,250	0	0	0	0	75,000	119,250
Planning Area 2 - Mullins[4, 7]	0	0	0	0	0	0	0	0	0	0	0	0	0
Planning Area 3 - Oakington[4, 7]	0	0	0	0	0	0	0	0	0	0	0	0	0
Planning Area 4 - Pulaski[4]	240	60,000	95,400	0	0	60,000	95,400	0	0	0	0	60,000	95,400
Planning Area 5 - Barkess[4, 8]	1,011	0	0	0	0	0	0	0	0	252,750	401,873	252,750	401,873
Planning Area 6 - Titan Terrace[4, 8]	223	0	0	0	0	0	0	0	0	55,750	88,643	55,750	88,643
Planning Area 7 - Old Robinhood[4, 8]	300	0	0	0	0	0	0	0	0	75,000	119,250	75,000	119,250
Planning Area 8 - Paradise[4, 8]	919	0	0	0	0	0	0	0	0	229,750	365,303	229,750	365,303
Planning Area 9 - Aldino-Stepney[6]	2,973	0	0	743,250	1,181,768	743,250	1,181,768	0	0	0	0	743,250	1,181,768
Planning Area 10 - Gilbert[6]	2,104	0	0	526,000	836,340	526,000	836,340	0	0	0	0	526,000	836,340
Planning Area 11 - Long / Heat[4]	400	100,000	159,000	0	0	100,000	159,000	0	0	0	0	100,000	159,000
Planning Area 12 - Grays[6, 7]	0	0	0	0	0	0	0	0	0	0	0	0	0
Planning Area 13 - Bush Chapel[4, 17]	300	75,000	119,250	0	0	75,000	119,250	0	0	0	0	75,000	119,250
Planning Area 13 - Bush Chapel[5, 17]	1,973	0	0	0	0	0	0	493,250	784,268	0	0	493,250	784,268
Planning Area 14 - Stepney[5, 7]	0	0	0	0	0	0	0	0	0	0	0	0	0
Planning Area 15 - Old Philadelphia[5, 7]	0	0	0	0	0	0	0	0	0	0	0	0	0
Planning Area 17 - Aberdeen Proving Ground[*]	0	0	0	0	0	0	0	0	0	0	0	0	0
New Demand	16,033	1,632,500	2,595,675	1,269,250	2,018,108	2,901,750	4,613,783	493,250	784,268	613,250	975,068	4,008,250	6,373,118
Total Demand (Existing + Future)	21,973 [16]	3,117,500	4,956,825	1,269,250	2,018,108	4,386,750	6,974,933	493,250	784,268	613,250	975,068	5,493,250	8,734,268

(1) Average Day Demands determined by 250 gpd/EDU
(2) Peaking Factor of 1.59 as determined from City records for years 2005-2009
(3) Existing EDUs based on average daily demand for years 2005-2009 divided by 250 gpd/EDU
(4) Identified in City DPW growth areas
(5) Identified to be provided by County water
(6) Areas mapped as "no planned service" in April 2010 Harford County Water & Sewer Master Plan
(7) Proposed EDU's for these growth areas is zero. Infrastructure extension to these areas is not expected in the near future.
(8) Identified to be provided water from County purchased bulk water
(9) Average day equals 12 hour pumping day
(10) Storage equals storage tanks plus wells equipped with backup power
(11) Based on average day of maximum month per water appropriations permit
(12) Assumes additional water sources are made available to allow maximum production of water treatment plant
(13) Average day demand during peak month of May 2007
(14) Assuming bulk water from County unavailable
(15) Average Month to Peak Month factor is 1.25; future average day of peak month equals future average day multiplied by 1.25
(16) 21,973 Total EDU's include 1973 EDUs to be served by the County leaving 20,000 EDUs to be served by the City of Aberdeen
(17) The Bosworth & Cornblatt annexations in the Planning Area 13 – Bush Chapel for a total of 300 EDUs which will be served by the City and the remaining EDUs will be served by the County.
* Aberdeen Proving Ground is included as Planning Area 17 but this area is not included in the Water and Sewer capacity calculations or Stormwater runoff calculations that are part of Water Resource Element

Well Capacity

Average Day-Permitted	1,500,000	gpd
Avg. Day of Max Month-Permitted	2,000,000	gpd
Maximum Pumping Day	2,571,840	gpd (actual pumping capacity of all the wells less largest well for 24 hours)
Water Treatment Plant Capacity	3,000,000	gpd
Max. day Bulk Water from County	900,000	gpd (maximum allowable water per current City-County agreement)
Avg. day Bulk Water from County	566,038	gpd (maximum allowable water divided by peaking factor of 1.59)
Water Storage	1,190,000	gallons
Wells pumping capacity with Backup power	1,445	gpm
Wells pumping capacity for the average day[6]	1,040,400.00	gpd
Total Storage[7]	2,230,400.00	gallons

Well Calculations for Existing Demand

Equal to Max pumping rate with largest well out of service[8]	2,000,000	gpd
Max. Day Demand	2,361,150	gpd
Water Capacity = Max day Wells + Max Bulk	2,900,000	gpd
Surplus of	538,850	gallons
Surplus of	1,356	EDUs
Max. Day Demand	2,361,150	
Water Capacity = WTP[9] + Max Bulk	3,900,000	
Surplus of	1,538,850	gallons
Surplus of	4,924	EDUs

Well Calculations for Future City Demand

Equal to Max pumping rate with largest well out of service[8]	2,000,000	gpd
Max. Day Demand (future City and Bulk water demand)	7,950,000	gpd
Water Capacity = Max day Wells + Max Bulk	2,900,000	gpd
Deficit of	5,050,000	gpd
Deficit of	16,160	EDUs
	3,507	gpm additional well capacity required
Max. Day Demand	7,950,000	gpd
Water Capacity = WTP[9] + Max Bulk	3,900,000	gpd
Deficit of	4,050,000	gpd
Deficit of	12,960	EDUs
	2,813	gpm additional well capacity required

Water Storage Calculations for Exisitng Demand

Equal to Avg. Day Demand during peak month plus fire flow (capacity includes wells/WTP on generator + Storage)

Avg. Day Peak Month Demand[10]	1,823,690	gallons
Fire Flow (2500 gpm for 3 hours)	450,000	gallons
Total Water Storage Required	2,273,690	gallons
Water Capacity = Tanks + Wells on backup Power + Avg. Bulk	2,796,438	gallons
Surplus of	522,748	gallons
Surplus of	2,091	EDUs
Water Capacity[11] = Tanks + Wells on backup Power	2,230,400	gallons
Deficit of	43,290	gallons
Deficit of	173	EDUs

Water Storage Calculations for Future City Demand

Equal to Avg. Day Demand during peak month plus fire flow (capacity includes wells/WTP on generator + Storage)

Avg. Day Demand Peak Month (future City and Bulk water demand)[12]	6,250,000	gallons
Fire Flow (2500 gpm for 3 hours)	450,000	gallons
Total Water Storage Required	6,700,000	gallons
Water Capacity = Tanks + Wells on backup Power + Avg. Bulk	2,796,438	gallons
Deficit of	3,903,562	gallons
Deficit of	15,614	EDUs
Water Capacity[11] = Tanks + Wells on backup Power	2,230,400	gallons
Deficit of	4,469,600	gallons
Deficit of	17,878	EDUs

Wastewater Flows for City of Aberdeen and Proposed Growth Areas

Location	EDU	City[4]		County[5]		No Planned Service[6]		Total		Total City (City+ No Planned Service)	
		Avg. Day (gpd)[1]	Peak Day[2] (gpd)	Avg. Day (gpd)[1]	Peak Day[2] (gpd)	Avg. Day (gpd)[1]	Peak Day[2] (gpd)	Avg. Day (gpd)[1]	Peak Day[2] (gpd)	Avg. Day (gpd)[1]	Peak Day[2] (gpd)
Planning Area 16 - Existing[3]	7,376	1,844,000	8,150,000[7]	0	0	0	0	1,844,000	8,150,000	1,844,000	8,150,000
Planning Area 16 - Infill[4]	3,854	963,500	3,854,000	0	0	0	0	963,500	3,854,000	963,500	3,854,000
Planning Area 1 - Swan Creek[4]	300	75,000	300,000	0	0	0	0	75,000	300,000	75,000	300,000
Planning Area 2 - Mullins[4, 7]	0	0	0	0	0	0	0	0	0	0	0
Planning Area 3 - Oakington[4, 7]	0	0	0	0	0	0	0	0	0	0	0
Planning Area 4 - Pulaski[4]	240	60,000	240,000	0	0	0	0	60,000	240,000	60,000	240,000
Planning Area 5 - Barkess[4, 8]	1,011	252,750	1,011,000	0	0	0	0	252,750	1,011,000	252,750	1,011,000
Planning Area 6 - Titan Terrace[4]	223	55,750	223,000	0	0	0	0	55,750	223,000	55,750	223,000
Planning Area 7 - Old Robinhood[4, 7]	300	75,000	300,000	0	0	0	0	75,000	300,000	75,000	300,000
Planning Area 8 - Paradise[4, 7]	919	229,750	919,000	0	0	0	0	229,750	919,000	229,750	919,000
Planning Area 9 - Aldino-Stepney[6]	2,973	0	0	0	0	743,250	2,973,000	743,250	2,973,000	743,250	2,973,000
Planning Area 10 - Gilbert[6]	2,104	0	0	0	0	526,000	2,104,000	526,000	2,104,000	526,000	2,104,000
Planning Area 11 - Long / Heat[4]	400	100,000	400,000	0	0	0	0	100,000	400,000	100,000	400,000
Planning Area 12 - Grays[6, 7]	0	0	0	0	0	0	0	0	0	0	0
Planning Area 13 - Bush Chapel[4, 12]	300	75,000	300,00	0	0			75,000	300,00	75,000	300,000
Planning Area 13 - Bush Chapel[5, 12]	1,973	0	0	493,250	1,973,000	0	0	493,250	1,973,000	0	0
Planning Area 14 - Stepney[5, 7]	0	0	0	0	0	0	0	0	0	0	0
Planning Area 15 - Old Philadelphia[5, 7]	0	0	0	0	0	0	0	0	0	0	0
Planning Area 17 - Aberdeen Proving Ground[*]	0	0	0	0	0	0	0	0	0	0	0
Total Future	14,597	1,886,750	7,547,000	493,250	1,973,000	1,269,250	5,077,000	3,649,250	14,597,000	3,156,000	12,624,000
Total (Existing + Future)	21,973 [11]	3,730,750	15,697,000	493,250	1,973,000	1,269,250	5,077,000	5,493,250	22,747,000	5,000,000	20,774,000

(1) Average Day Flows determined by 250 gpd/EDU
(2) Standard Peaking Factor of 4.0 used for infill and all new development
(3) Existing EDUs based on average daily flows for years 2005-2009 divided by 250 gpd/EDU
(4) Identified in City DPW growth areas
(5) Identified to be provided by County sewer
(6) Areas mapped as "no planned service" in April 2010 Harford County Water & Sewer Master Plan
(7) Proposed EDU's for these growth areas is zero. Infrastructure extension to these areas is not expected in the near future.
(8) Existing Peak Day flow measured during the month of December 2009 with a monthly rainfall of 6.23 inches.
(9) TN = Total Nitrogen; TP = Total Phosphorus
(10) BNR = Biological Nutrient Removal; ENR = Enhance Nutrient Removal
(11) 21,973 Total EDU's include 1973 EDUs to be served by the County leaving 20,000 EDUs to be served by the City of Aberdeen
(12) The Bosworth & Cornblatt annexations in the Planning Area 13 – Bush Chapel for a total of 300 EDUs which will be served by the City and remaining EDUs will be served by the County.
* Aberdeen Proving Ground is included as Planning Area 17 but this area is not included in the Water and Sewer capacity calculations or Stormwater runoff calculations that are part of Water Resource Element.

Wastewater Treatment Plant Capacity		
Average Day Permitted Flow	4,000,000	gpd
Peak Flow	6,000,000	gpd
TN[8] permitted	48,729	lbs/yr
TP[8] permitted	3,665	lbs/yr
Existing Flows		
Average Day	1,844,000	gpd
Surplus of	2,156,000	gpd
Surplus of	8,624	EDUs
Nutrients at Exisitng Flows		
TN 8 mg/l (BNR[9])	44,907	lbs/yr
TN 4 mg/l (ENR[9])	22,453	lbs/yr
TP 0.3 mg/l (ENR)	1,684	lbs/yr
Nutrients at Permitted Flow		
TN 8 mg/l (BNR)	97,411	lbs/yr
TN 4 mg/l (ENR)	48,706	lbs/yr
TP 0.3 mg/l (ENR)	3,653	lbs/yr

Future Flows (City service + No Planned Service)		
Average Day	5,000,000	gpd
Deficit of	1,000,000	gpd
Deficit of	4,000	EDUs
Total Nitrogen at Future Flows		
TN 4 mg/l (ENR)	60,882	lbs/yr
Excess of	12,513	lbs/yr
Required TN to meet permit limits	3.2	mg/l
Total Phosphorus at Future Flows		
TP 0.3 mg/l (ENR)	4,566	lbs/yr
Excess of	901	lbs/yr
Required TP to meet permit limits	0.241	mg/l